



Effect of changes in season and temperature on mortality associated with air pollution in Seoul, Korea

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Year: 2011
Journal: Journal of Epidemiology and Community Health. 65 (4): 368-375

Abstract:

BACKGROUNDS: Global warming has increased concern about the synergistic or interactive effects of temperature and air pollution on human health. The aim of this study was to examine the effect of changes in season and temperature on mortality associated with air pollution in Seoul, Korea, from June 1999 to December 2007. **METHODS:** We used Poisson regression models with natural cubic splines. The effect of modifications was explored with two models: a time-varying coefficient model and a temperature-stratified model. **RESULTS:** In the summer season with high temperatures, we observed a considerable increase in the association between mortality and air pollution. The elevated risk was pronounced particularly in the effect of SO₂, and the increase of RR on non-accidental mortality was 0.83% (95% CI 0.42 to 1.25) at high temperatures (>/Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 26.2 degrees C) whereas the overall estimate was 0.21% (95% CI 0.07 to 0.36) per 0.5 ppb increment of SO₂. Those aged 65 y and over generally showed a higher risk of mortality. At extremely high temperature, the age group 85 y and older was especially vulnerable to air pollution. In a two-pollutant model, the significant effect of SO₂ at high temperatures (>/Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 26.2 degrees C) was not confounded by adjusting for other pollutants and the effect of CO at temperatures of 19.1-26.2 degrees C remained largely unchanged by adjusting for other pollutants. The dominant adverse effect of SO₂ at high temperatures might be explained by an increase in concentration of sulfates by enhanced photochemical reaction, whereas at milder temperatures without vigorous photochemical activity the effect of CO may predominate in increasing mortality. **CONCLUSIONS:** Season and temperature strongly modified the adverse effect of air pollution, which implicates that an increase in the number of hot summer days by global warming may alter the health effects of air pollution.

Source: <http://dx.doi.org/10.1136/jech.2009.089896>

Resource Description

Exposure : ☐

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Temperature

Air Pollution: Interaction with Temperature, Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): SO₂;CO

Climate Change and Human Health Literature Portal

Temperature: Extreme Heat, Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Urban

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: South Korea

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : respiratory disease mortality

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified